

pragma's

product profiles

Issue #36

The *free* newspaper for Pick™ users.

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How to write your own screen editor

In the early days of electronic computing, text editors usually required the user to type a command to perform every operation. A single command might allow every occurrence of a word in a text file to be replaced by some other word, but another command would then be necessary to list the text and show the results of the replace operation. Because of the slow speed of Teletypes, IBM "golf ball" printers, dot matrix printers, and other terminals of that era, text editors tried to save time and paper by not generating any output unless requested by the user.

As the use of display terminals became widespread, text editors began to take advantage of those 24 rows and 80 columns. Now, good text editors constantly display the text being edited. Users can move a cursor around the screen, then delete, insert, or change text, and instantly see results without having to edit an "invisible" copy stored somewhere in the computer's memory.

Unfortunately, Pick's standard Edit processor is one of those old-fashioned "line" editors. Fortunately, it isn't too difficult to create a real display editor that makes up for the deficiencies in Edit. The SCREEN.EDIT program listed in this issue is an example of just such a display editor.

SCREEN.EDIT displays any item, 24 attributes at a time. By using the numeric pad, a user can move the cursor in any horizontal and vertical direction. The cursor automatically moves to previous or next lines after the start or end of a line, respectively. The screen automatically scrolls vertically, for items with more than 24 attributes, and horizontally, for attributes wider than the screen, so the cursor is always in view.

Typing T (for top) instantly displays an item's first 24 lines, while B displays the bottom 24. A minus sign causes the character under the cursor to be deleted. Deleting the invisible carriage return (attribute mark) at the end of a line automatically concatenates the line with the line that follows. And typing I causes all subsequently typed characters to be inserted at the cursor's position, until the escape key is hit. Naturally, carriage returns (attribute marks) can also be inserted.

Typing G (for go to) causes a nifty "dialog box" to pop up on the screen, prompting for the line number the cursor should go to. Pop-up dialog boxes avoid the need to reserve space on the screen for prompts or status messages, and allow every position of the screen to be used for displaying editable text. A dialog box also appears after typing E, to verify the operator really wants to exit the item and leave it unchanged. The F command files an edited item back on disk.

Why is SCREEN.EDIT of interest? Because it shows how any program can be made completely cursor-driven when it

displays an existing piece of text or data (even if only one line) and prompts the operator for changes. When your application program prompts to change a date, should your users really be required to retype the whole line, just to change a digit in the middle? Wouldn't it be nice to just move the cursor to the offending character, and delete or replace it?

SCREEN.EDIT shows how it's possible to build a powerful editing capability, even though it's programmed in BASIC. Some programmers may want to extend SCREEN.EDIT by adding other important editing capabilities, and turn it into a custom editor with only the features they want. Some possible extensions: optional attribute number display, moving to the top or bottom of the current display page, moving to the previous or next word or display page, searching for text, deleting whole words and lines, replacing text by overwriting (instead of separate deleting and inserting steps), merging other items, handling tabs, "undoing" previous edits, changing the case of text, cut-copy-paste, verifying File commands, and other features popular in other text editors.

Some programmers might want to create a stripped-down, subroutine version of SCREEN.EDIT that could be called by any program to allow cursor-driven editing of any data field. In that case, SCREEN.EDIT would have to be told the co-ordinates where the field should be displayed, its width, and the maximum number of lines to show (which might be attributes, values, or subvalues). Formatted data entry capabilities such as validation masks and field justification might also be included.

SCREEN.EDIT is built around a large loop in lines 22 to 92. The loop inputs a command character at line 24, then tries a series of CASE tests to determine what function should be performed. Note that because a standard Pick INPUT statement is used, SCREEN.EDIT can't tell a backspace from a carriage return. Your version of Pick might allow a SYSTEM call or some other way to input a byte while avoiding standard Pick decoding, which prevents the detection of many control characters such as backspace, control-R, and so on.

Most of the logic in SCREEN.EDIT is concerned with the proper handling of a number of important variables: TEXT is the current attribute that contains the cursor and is therefore being edited, LENGTH is the number of characters in TEXT plus one to account for the attribute mark, LINE is the number of the current attribute, COLUMN is the column in TEXT that the cursor is positioned on, LEFT.MARGIN is the leftmost TEXT column shown on the display, RIGHT.MARGIN is the rightmost column, TOP is the number of the attribute at the top of the display, BOTTOM is the last attribute number displayed (which may not be on the terminal's bottom row after some text is deleted), LAST is the last attribute number in the text, and all text is stored in ITEM.

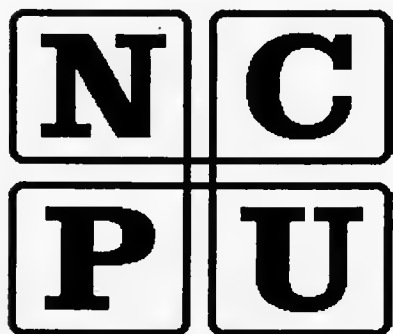
Most of the code in SCREEN.EDIT should be self-explanatory to an experienced programmer. If you run into any problems while experimenting with SCREEN.EDIT, just give us a call, and we'll be happy to answer any questions you have.

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SCREEN.EDIT
001 EQU bell TO CHAR(7) ; * ASCII code to ring terminal's bell
002 EQU box.height TO 6 ; * Height of dialog box for Goto, Exit
003 EQU escape TO CHAR(251) ; * ASCII code for escape to end insert
004 EQU indent TO 5 ; * Amount of indent because of line numbers
005 EQU false TO 0, true TO -1 ; * Booleans for logic tests
006 eos = @(-3) ; eol = @(-4) ; * Clr to end of screen, end of line
007 crt.width = SYSTEM(2) ; * Characters across, usually 79
008 crt.height = SYSTEM(3) ; * Vertical line count, usually 24
009 half.width = INT(crt.width/2) ; * Horiz. scroll amt, usually 39
010 half.height = INT(crt.height/2) ; * Vert. amt, usually 12
011 format = "R%":(indent-1) ; * R%4 attribute number format
012 text.width = crt.width - indent ; * Columns remaining for text
013 CRT "Edit what file": ; INPUT FILE
014 OPEN FILE ELSE STOP "No such file"
015 CRT "Edit what item in ":FILE: ; INPUT ID
016 PROMPT "" ; ECHO OFF ; READ ITEM FROM ID ELSE ITEM = ""
017 LAST = COUNT(ITEM,CHAR(254))+1
018 IF ITEM<LAST> = "" THEN LAST = LAST-1
019 IF LAST <= 0 THEN LAST = 1
020 CHANGED = false ; * No changes have occurred
021 GOSUB top ; * Display top of item
022 LOOP
023 GOSUB set.cursor ; * Show cursor at current edit point
024 INPUT COMMAND,1: ; COMMAND = OCONV(COMMAND,"MCU")
025 UNTIL COMMAND = "F" DO ; * Execute commands until user files
026 BEGIN CASE
027 CASE COMMAND = "" ; * Move to start of current or next line
028 IF COLUMN = 1 THEN GOSUB next.line ELSE GOSUB column.one
029 CASE COMMAND = "-" ; * Delete character at cursor
030 CHANGED = true ; * Remember editing has occurred
031 IF COLUMN = LENGTH THEN ; * Deleting an attribute mark
032 TEXT = TEXT : ITEM<LINE+1> ; LENGTH = LEN(TEXT)+1
033 ITEM<LINE> = TEXT ; DEL ITEM<LINE+1>
034 IF LINE # LAST THEN LAST = LAST-1 ELSE CRT bell:
035 BOTTOM = LINE ; GOSUB paint.page.part
036 END ELSE ; * Delete character before end of line
037 TEXT = TEXT[1,COLUMN-1]:TEXT[COLUMN+1,LENGTH-COLUMN-1]
038 LENGTH = LENGTH-1 ; GOSUB refresh.line

```

```

039 END
040 CASE COMMAND = "2" ; GOSUB next.line ; * Move cursor down
041 CASE COMMAND = "4" ; * Move cursor left
042 IF COLUMN > 1 THEN ; * Stay on current line
043 COLUMN = COLUMN-1 ; GOSUB check.left.margin
044 IF SHIFTED THEN GOSUB paint.page
045 END ELSE ; * Go to previous line
046 GOSUB prev.line
047 IF MOVE:OK THEN
048 COLUMN = LENGTH ; GOSUB check.right.margin
049 IF SHIFTED THEN GOSUB paint.page
050 END
051 END
052 CASE (COMMAND="6") OR (COMMAND=" ") ; GOSUB cursor.right
053 CASE COMMAND = "8" ; GOSUB prev.line ; * Move cursor up
054 CASE COMMAND = "B" ; * Move to bottom of item
055 LINE = LAST ; GOSUB set.text.length ; COLUMN = LENGTH
056 GOSUB check.left.margin ; GOSUB check.right.margin
057 TOP = LINE-crt.height+1 ; IF TOP < 1 THEN TOP = 1
058 GOSUB paint.page
059 CASE COMMAND = "E" ; * Exit
060 IF CHANGED THEN ; * Edits have occurred, ask permission
061 QUESTION = "Item changed! Exit now? Y or N?" ; GOSUB box
062 END ELSE ANSWER = "Y" ; * Assume permission
063 IF ANSWER = "Y" THEN GOSUB final.position ; STOP
064 CASE COMMAND = "G" ; * Go to a line number
065 QUESTION = "Go to what line number?" ; GOSUB box
066 ANSWER = ICONV(ANSWER,"MCN")
067 IF ANSWER # "" THEN
068 LINE = ANSWER ; IF LINE < 1 THEN LINE = 1
069 IF LINE > LAST THEN LINE = LAST
070 COLUMN = 1 ; GOSUB set.text.length
071 TOP = LINE - half.height ; IF TOP < 1 THEN TOP = 1
072 GOSUB paint.page
073 END
074 CASE COMMAND = "I" ; * Insert new text
075 LOOP INPUT ICHAR,1: UNTIL ICHAR = escape DO
076 IF ICHAR # "" THEN ; * Insert char in current line
077 TEXT = TEXT[1,COLUMN-1]:ICHAR:TEXT[COLUMN,LENGTH-COLUMN]

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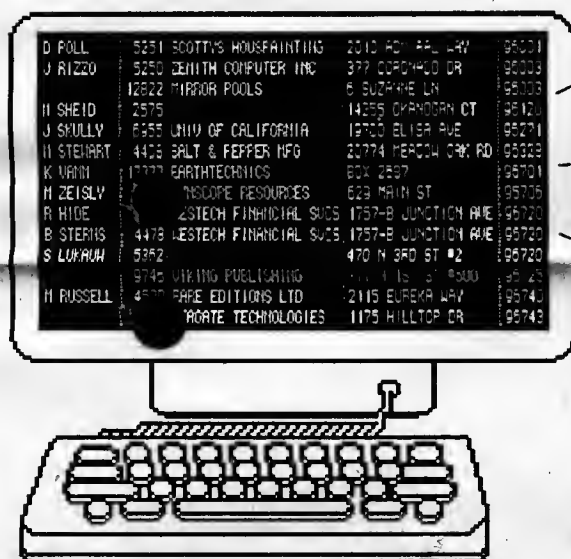
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Ask us for a free copy of Product Profiles #24, describing how B-TREE-P was originally developed and put to work. As one of Semaphore's programmers says: "We often ask ourselves why we waited so long to create B-TREE-P. After using it for our own production work, we wonder how we ever got by before without it. A Pick computer without B-TREE-P is like a car without wheels".

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**ONCE UPON A TIME,
there lived a Pick™ computer user named Linda.**

Every workday, from eight to five, Linda would sit in front of a terminal and type commands to make her computer produce reports. Sometimes the commands worked quickly and would make Linda's computer instantly display results. But usually Linda had to type a command that began with the dreaded words SORT or SELECT. Then the computer would take forever to process the command, and Linda would have to wait a long time before the computer could display the report.

Fortunately, Linda could stay busy while waiting for a RT, because that's when she would always get lots of phone calls from her coworkers, who wanted to know why the displays on their terminals were suddenly slowing down to a crawl.

As each day passed, Linda got more and more bored with her slow computer.

One day, something terrible happened. Linda had just finished waiting ninety minutes for a complicated SORT, and was paging through the report on her terminal. Suddenly, Linda accidentally hit the Return key, and page four of the report flashed by before she could read it. Linda would have to do the whole SORT over again just to see page four. Linda almost had a nervous breakdown.

Fortunately, Linda pulled herself together. But Linda was mad. She just wasn't going to put up with those slow SORTs and SELECTs anymore. So Linda bought B-TREE-P.

Now Linda is very happy. She doesn't have to wait for her computer to SORT. Linda can instantly find and display any data she's looking for. Even scroll forward and backward through her files. And the computer isn't sluggish anymore.

**The moral of this story? Buy B-TREE-P.
You'll be as happy as Linda.**

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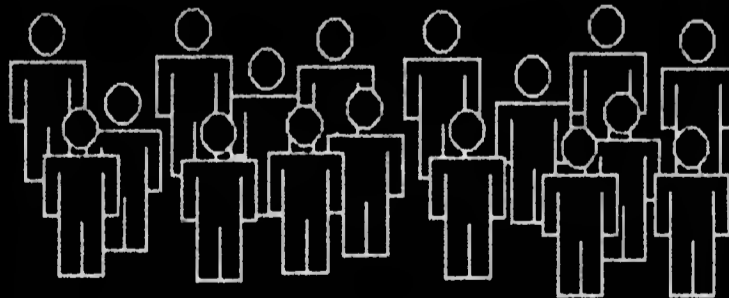
```

078 LENGTH=LENGTH+1 ; GOSUB refresh.line ; GOSUB cursor.right
079 END ELSE ; * Insert carriage return (attribute mark)
080 NEW.TEXT = TEXT[COLUMN,LENGTH-COLUMN]
081 TEXT = TEXT[1,COLUMN-1] ; GOSUB refresh.line
082 INS NEW.TEXT BEFORE ITEM<LINE+1> ; LAST = LAST+1
083 IF LINE#BOTTOM THEN BOTTOM=LINE+1 ; GOSUB paint.page.part
084 GOSUB column.one ; GOSUB next.line
085 END
086 GOSUB set.cursor ; CHANGED=true ; * Remember edits occurred
087 REPEAT
088 GOSUB refresh.line ; * Because escape clobbers it on tube
089 CASE COMMAND = "T" ; GOSUB top ; * Move to top of item
090 CASE 1 ; CRT bell: ; * Unrecognized command, complain
091 END CASE
092 REPEAT
093 WRITE ITEM ON ID ; GOSUB final.position ; STOP
094 *
095 final.position: * Move cursor to bottom, echo on
096 CRT @(0,crt.height-1) ; ECHO ON ; RETURN
097 *
098 top: * Display top of item
099 LEFT.MARGIN = 1 ; RIGHT.MARGIN = text.width
100 LINE = 1 ; COLUMN = 1 ; GOSUB set.text.length
101 TOP = 1 ; GOSUB paint.page
102 RETURN
103 *
104 set.cursor: * Show cursor at current edit position
105 CRT @(COLUMN+indent-LEFT.MARGIN,LINE-TOP) ; RETURN
106 *
107 set.text.length: * Set TEXT, LENGTH, COLUMN
108 TEXT = ITEM<LINE> ; LENGTH = LEN(TEXT)+1
109 IF COLUMN > LENGTH THEN ; * Cursor past end of line
110 COLUMN = LENGTH ; GOSUB check.left.margin
111 END ELSE SHIFTED = false
112 RETURN
113 *
114 paint.page: * Paint lines on tube starting from top
115 BOTTOM = TOP
116 paint.page.part: * Enter here if BOTTOM already set
117 LOOP
118 CRT @(0,BOTTOM-TOP):BOTTOM format: ; GOSUB gap
119 CRT ITEM<BOTTOM>[LEFT.MARGIN,text.width]:eol:
120 UNTIL (BOTTOM = LAST) OR ((BOTTOM-TOP+1) = crt.height) DO
121 BOTTOM = BOTTOM+1
122 REPEAT
123 CRT eos: ; * Clear to end of screen
124 RETURN
125 *
126 gap: * Indicate if left margin is > 1
127 IF LEFT.MARGIN > 1 THEN CRT "<": ELSE CRT " ":
128 RETURN
129 *
130 refresh.line: ITEM<LINE> = TEXT ; * Redisplay current line
131 CRT @(indent,LINE-TOP):TEXT[LEFT.MARGIN,text.width]:eol:
132 RETURN
133 *
134 next.line: * Move cursor down to next line

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```
135 MOVE.OK = LINE < LAST
136 IF MOVE.OK THEN ;* There's a line below
137 LINE = LINE+1 ; GOSUB set.text.length
138 IF SHIFTED THEN GOSUB paint.page
139 IF LINE > BOTTOM THEN ;* Moved below end of screen
140 CRT @(0,crt.height-1) ;* Force scroll
141 CRT LINE format: ; GOSUB gap
142 CRT TEXT[LEFT.MARGIN,text.width]:eol:
143 TOP = TOP+1 ; BOTTOM = BOTTOM+1
144 END
145 END ELSE CRT bell: ;* No where to move
146 RETURN
147 *
148 column.one: * Force cursor to column one
149 COLUMN = 1 ; GOSUB check.left.margin
150 IF SHIFTED THEN GOSUB paint.page
151 RETURN
152 *
153 check.right.margin: * Shift display to right?
154 SHIFTED = COLUMN > RIGHT.MARGIN
155 IF SHIFTED THEN ;* Shift until cursor in view
156 LOOP
157 LEFT.MARGIN = LEFT.MARGIN + half.width
158 RIGHT.MARGIN = RIGHT.MARGIN + half.width
159 UNTIL COLUMN <= RIGHT.MARGIN DO REPEAT
160 END
161 RETURN
162 *
163 check.left.margin: * Shift display to left?
164 SHIFTED = COLUMN < LEFT.MARGIN
165 IF SHIFTED THEN ;* Shift until cursor in view
166 LOOP
167 LEFT.MARGIN = LEFT.MARGIN - half.width
168 RIGHT.MARGIN = RIGHT.MARGIN - half.width
169 UNTIL LEFT.MARGIN <= COLUMN DO REPEAT
170 END
171 RETURN
172 *
173 prev.line: * Move cursor up to previous line
174 MOVE.OK = LINE > 1
175 IF MOVE.OK THEN ;* There's a line above
176 LINE = LINE-1 ; GOSUB set.text.length
177 IF LINE < TOP THEN ;* Moved above top of screen
178 TOP = LINE - half.height ; IF TOP < 1 THEN TOP = 1
179 SHIFTED = true
180 END
181 IF SHIFTED THEN GOSUB paint.page
182 END ELSE CRT bell: ;* No where to move to
183 RETURN
184 *
185 cursor.right: * Move cursor right one character
186 IF COLUMN < LENGTH THEN ;* Moving within current line
187 COLUMN = COLUMN+1 ; GOSUB check.right.margin
188 IF SHIFTED THEN GOSUB paint.page
189 END ELSE ;* At end of line, go to next line
190 GOSUB next.line
191 IF MOVE.OK THEN
```

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192 COLUMN = 1 ; GOSUB check.left.margin
193 IF SHIFTED THEN GOSUB paint.page
194 END
195 END
196 RETURN
197 *
198 box: * Display a dialogue box
199 BOX.X = COLUMN+indent-LEFT.MARGIN ; BOX.Y = LINE-TOP+1
200 QLENGTH = LEN(QUESTION) ; BOX.WIDTH = QLENGTH+7
201 IF (BOX.X+BOX.WIDTH)>=crt.width THEN BOX.X=crt.width-BOX.WIDTH
202 IF (BOX.Y+box.height)>=crt.height THEN
    BOX.Y=crt.height-box.height
203 CRT @(BOX.X,BOX.Y):"+":STR("-",BOX.WIDTH-2):"+":
204 FOR B = BOX.Y+1 TO BOX.Y+box.height-2
205 CRT @(BOX.X,B):"|":SPACE(BOX.WIDTH-2):"|":
206 NEXT B
207 CRT @(BOX.X,BOX.Y+box.height-1):"+":STR("-",BOX.WIDTH-2):"+":
208 CRT @(BOX.X+3,BOX.Y+2):QUESTION: ;ANSWER="";ECHO ON;PROMPT " "
209 INPUT @(BOX.X+3,BOX.Y+3):ANSWER,QLENGTH: ;ECHO OFF;PROMPT ""
210 FOR B = BOX.Y TO BOX.Y+box.height-1
211 HIDDEN.LINE = B+TOP
212 IF HIDDEN.LINE <= LAST THEN
213 REFRESH.TEXT = ITEM<HIDDEN.LINE>[LEFT.MARGIN,text.width]
214 END ELSE REFRESH.TEXT = ""
215 CRT @(indent,B):REFRESH.TEXT:eol:
216 NEXT B
217 RETURN
218 *
219 END
    
```

```

ANSWER 62* 63 66 66* 67 68 208* 209*
B 204* 205 210* 211 215
BOTTOM 35* 83 83* 115* 118 119 120 121 121* 139 143 143*
BOX.WIDTH 200* 201 203 205 207
BOX.X 199* 201 201* 203 205 207 208 209
BOX.Y 199* 202 202* 203 204 207 208 209 210
CHANGED 20* 30* 60 86*
COLUMN 28 31 37 42 43 43* 48* 55* 70* 77 80 81 100* 105
109 110* 149* 154 159 164 169 186 187 187* 192* 199
COMMAND 24* 25 27 29 40 41 52 53 54 59 64 74 89
FILE 13* 14 15
HIDDEN.LINE 211* 212 213
ICHAR 75* 76 77
ID 15* 16 93
ITEM 16* 17 18 32 33 33* 33* 82 82* 93 108 119 130 1
213
LAST 17* 18 18* 19 19* 34 34* 55 69 82 82* 120 135 212
LEFT.MARGIN 99* 105 119 127 131 142 157 157* 164 167 167*
169 199 213
LENGTH 31 32* 37 38 38* 48 55 77 78 78* 80 108* 109
186
LINE 32 33 34 35 55* 57 68* 69 69* 71 82 83 100* 105 108
130 131 135 137 137* 139 141 174 176 176* 177 178 199
MOVE.OK 47 135* 136 174* 175 191
NEW.TEXT 80* 82
QLENGTH 200* 209
QUESTION 61* 65* 200 208
REFRESH.TEXT 213* 214* 215
RIGHT.MARGIN 99* 154 158 158* 159 168 168*
SHIFTED 44 49 111* 138 150 154* 155 164* 165 179* 181 188
193
TEXT 32 32* 33 37 37* 77 77* 80 81 81* 108* 130 131 142
TOP 57* 71* 101* 105 115 118 120 131 143 143* 177 178* 199
211
bell 1 34 90 145 182
box 61 65 198*
box.height 2 202 204 207 210
check.left.margin 43 56 110 149 163* 192
check.right.margin 48 56 153* 187
column.one 28 84 148*
crt.height 8* 10 57 96 120 140 202
crt.width 7* 9 12 201
cursor.right 52 78 185*
eol 6* 119 131 142 215
eos 6* 123
escape 3 75
false 5 20 111
final.position 63 93 95*
format 11* 118 141
gap 118 126* 141
half.height 10* 71 178
half.width 9* 157 158 167 168
indent 4 11 12 105 131 199 215
next.line 28 40 84 134* 190
paint.page 44 49 58 72 101 114* 138 150 181 188 193
paint.page.part 35 83 116*
prev.line 46 53 173*
refresh.line 38 78 81 88 130*
set.cursor 23 86 104*
set.text.length 55 70 100 107* 137 176
text.width 12* 99 119 131 142 213
top 21 89 98*
true 5 30 86 179
    
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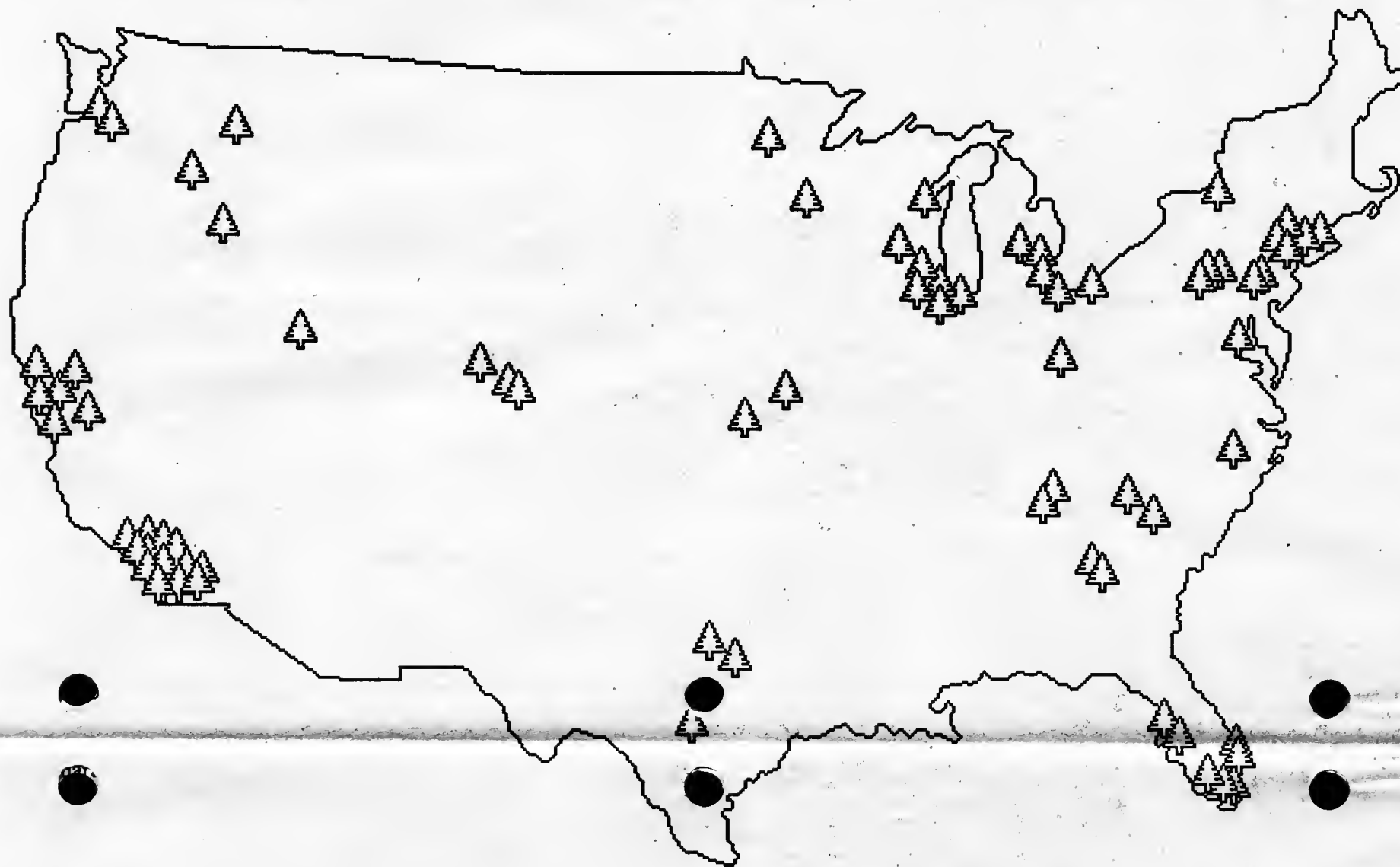
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